ECE 626 **Analog CMOS Integrated Circuit Design** **Winter 99**

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Reference texts: Analog Integrated Circuit Design, Johns/Martin
Analog MOS Integrated Circuits for Signal Processing, Gregorian/Temes
Analysis and Design of Analog Integrated Circuits, Gray/Meyer
Design of Analog-Digital VLSI Ckts. for Telecom. and Signal Proc., Franca/Tsividis
Electronic Filter Design Handbook, Williams/Taylor

Course content: The reason for offering this course is to give you a solid exposure to a set of basic circuits that are commonly used in the IC industries today. The class organization is to be very flexible and geared towards learning how to design analog ICs. We will spend a week or two reviewing ECE 520 material, and many weeks will be spent on the design of active filters, both switched-capacitor and continuous-time filters. I feel that in the process of understanding analog filter design, you will be exposed to most critical analog IC design issues, and would be prepared for self-learning of any new material. Depending on the class interest and time availability, the list of following topics will be explored.

Active filter synthesis (discrete-time and continuous-time, biquad, ladder, LDI, Bilinear…)
Analog-to-digital converters (ADC) and digital-to-analog converters (DAC)
(pipeline, folding/interpolating, current-steering, charge-redistribution…)
Phase-locked loops (PLL) / frequency synthesizer
Bandgap reference circuits, and common biasing schemes
Highly-linear tunable continuous-time filters
Self-tuning/trimming techniques for filters, PLLs…
High-frequency / double-sampling switched-capacitor filters
Low-voltage switched-capacitor circuits
Error-shaping (e.g. Delta-Sigma, mismatch-shaping) data converters

Computer tools: HSPICE or Spectre, SWITCAP, and MATLAB

Grading: The course grading will be done in four equal parts, which include an oral exam (midterm), a 25-min presentation of paper review (topic of your choice), and a final project (transistor-level circuit design).

Homework (mini-projects)	25%
Midterm (oral exam)	25%
Paper review/presentation	25%
Final design project	25%